

APPLICATION FOR  
UNITED STATES LETTERS PATENT  
SPECIFICATION

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TO WHOM IT MAY CONCERN:

Be it known that I, Brian KwangShik Hong, a citizen of the United States of America, and resident of the State of California, having a postal address of 806 S. Rimpau, Los Angeles, California 90005, and Ran Soo Hong, a citizen of the United States of America, and resident of the State of California, having a postal address of 806 S. Rimpau, Los Angeles, California 90005, have invented a new and useful "**PERIPHERAL VIEWING SYSTEM FOR A VEHICLE**", of which the following forms the specification.

**PERIPHERAL VIEWING SYSTEM FOR A VEHICLE**

**CROSS REFERENCE TO RELATED APPLICATIONS**

This application is entitled to the benefit of provisional application no.

60/417,986 filed on October 11, 2002.

## 5 BACKGROUND OF THE INVENTION

The present invention relates to an improved peripheral viewing system for a vehicle that replaces conventional side and rearview mirrors.

## **DESCRIPTION OF THE PRIOR ART**

Vehicles are typically equipped with externally mounted mirrors on each side, positioned immediately in front of the passenger and driver side doors to allow a driver to determine if vehicles are approaching from an adjacent lane.

Vehicles are also equipped with a rearview mirror allowing the driver to observe trailing vehicles. However, such mirrors have several disadvantages. The field of view projected by such mirrors is limited thereby resulting in blind spots particularly with respect to the side view mirrors. The blind spots created by the side view mirrors are responsible for numerous accidents.

In an effort to reduce or eliminate the blind spots, automobile manufacturers employ concave or other reduction type mirrors; though such mirrors are somewhat effective in reducing blind spots, they are deceptive in that objects will

appear to be smaller or farther away than actual. Finally, the externally mounted side view mirrors are obtrusive and often collide with other objects requiring frequent replacement. The obtrusive mirrors also significantly increase the wind drag on the vehicle. The present invention eliminates the problems associated 5 with conventional side and rear view mirrors by providing a video monitoring system for a vehicle that greatly enhances the viewing range of the driver.

Although at least one vehicle video monitoring system exists in the prior art, the system has several disadvantages. For example, U.S. patent no. 5,680,123 issued to Lee discloses a vehicle monitoring system including a plurality of video 10 cameras mounted in various locations on a vehicle exterior, including each side and the rear. A single video display is mounted within the passenger compartment. A specific camera output is only displayed in response to a triggering event such as activation of a turn signal or actuation of a vehicle alarm. If the turn signal is in a neutral position, only the rear camera output is displayed. 15

The above described device has several disadvantages. In order to display the output of a side video camera, a user activate the turn signal. However, only the side camera corresponding to the direction of the activated turn signal is displayed. Otherwise, the driver can only view the output of the rear camera. Additionally, the system employs a single video display limiting the driver to a

single view at any given time. Finally, the system includes no warning system for alerting the driver of an approaching vehicle in the event the approaching vehicle is outside the viewing range of the cameras.

The present invention overcomes the above enumerated problems associated  
5 with conventional peripheral viewing systems by providing low profile,  
aerodynamic, side mounted digital cameras that continuously transmit a digital  
image to designated display screens within the vehicle passenger compartment  
allowing a vehicle driver to have a continuous, panoramic view of the vehicle  
exterior. A similar camera is mounted on the rear of the vehicle that continuously  
10 transmits an image to a corresponding display unit. The device also includes rear-  
mounted infrared sensors for warning the driver if an approaching vehicle is in the  
“blind spot” and therefore not visible on either of the displays.

## **SUMMARY OF THE INVENTION**

The present invention discloses a peripheral viewing system for a vehicle.  
15 The system includes a low profile, externally mounted digital camera positioned  
immediately in front of both the passenger and driver door, in generally the same  
location as a conventional side view mirror. A similar low profile digital camera  
may be mounted on the vehicle roof immediately adjacent the top edge of the rear  
window. Each camera is electrically connected to a controlling computer that

transmits the camera output to a designated LCD mounted within the vehicle passenger compartment. Preferably, the display associated with the driver side camera is positioned immediately to the left of the steering wheel while the display associated with the passenger side camera is mounted in front of the passenger seat but positioned to face the vehicle driver. The rear camera display is mounted immediately to the right of the vehicle steering wheel.

5 Additionally, the system may also include one or more infrared phototransistor detectors positioned on either side, near the vehicle rear, preferably immediately in front of the taillight. The phototransistor is in communication with  
10 the controlling computer and a speaker within the passenger compartment.

Accordingly, if a trailing vehicle is approaching in the adjacent lane and is within a predetermined range of the vehicle, a warning signal is sent to the computer instructing it to emit a synthesized voice message warning the driver not to change lanes. The warning message is only emitted, however, if the driver activates a turn  
15 signal corresponding to the direction of the approaching vehicle.

It is therefore an object of the present invention to provide a vehicle viewing system that greatly exceeds the capabilities of conventional vehicle side and rear view mirrors.

It is another object of the present invention to provide a viewing system for

vehicles that enhances vehicle safety.

It is yet another object of the present invention to provide a peripheral viewing system for a vehicle that eliminates the problems associated with obtrusive side mounted exterior mirrors.

5 Other objects, features and advantages of the present invention will become readily apparent from the following detailed description of the preferred embodiment when considered with the attached drawings and the appended claims.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

10 Figure 1 is a top view of a vehicle with conventional rear and side view mirrors.

Figure 2 is a side perspective view of a vehicle with a digital camera mounted thereon.

15 Figure 3 is a top perspective view of the vehicle with the rear digital camera mounted thereon.

Figure 4 depicts a side view of display panel according to the present invention.

Figure 5 depicts a vehicle interior with the display panels mounted therein.

Figure 6 depicts the infrared sensors mounted on a vehicle.

Figure 7 depicts an infrared phototransistor receiver/transmitter according to the present invention.

## **DESCRIPTION OF THE PREFERRED EMBODIMENT**

Now referring to Figures 1 through 7, the present invention discloses a peripheral viewing system for a vehicle. The system includes a pair of low profile, externally mounted digital cameras **1** each positioned immediately in front of either the passenger or driver door in generally the same location as a conventional side view mirror **6**. Each camera is encased within a contoured, aerodynamic housing **33** to minimize drag. A similar low profile digital camera **3** may be mounted on the vehicle roof immediately adjacent the top edge of the rear window for replacing the conventional rear view mirror **41**. Preferably, each camera is a progressive scan, interline-transfer CCD.

Each camera is electrically connected to a controlling computer **10** mounted within the vehicle passenger compartment. The computer interlinks each camera with a designated liquid crystal display (LCD) or similar video display likewise mounted within the vehicle passenger compartment. Preferably, the display **5** associated with the driver side camera is positioned immediately to the left of the steering wheel while the display **7** associated with the passenger side camera is positioned immediately to the right of the steering wheel. In the event that a

rearview camera is used, the display **9** associated therewith is mounted immediately to the right of the vehicle steering wheel while the passenger side display panel is mounted in front of the passenger compartment but positioned to face the vehicle driver. Each display also includes a brightness control knob **12** 5 mounted thereon to minimize distraction to the driver. Each display may include a mounting bracket **42** for installing on a vehicle dash board, or the displays may be integral therewith.

Additionally, the system may also include one or more infrared phototransistor detectors **2** positioned on the side of the vehicle, near the rear, 10 immediately adjacent the taillight. The phototransistor is in communication with the controlling computer and a speaker **4**. Each phototransistor includes an infrared transmitter LED **30** and a modulated infrared receiver **31**. The sensors are able to detect objects within a predetermined range of the vehicle. Preferably, the sensors are operated at 40 Khz modulation so as to reject spurious light.

15 Accordingly, if a trailing vehicle is approaching in the adjacent lane and is within the predetermined range of the vehicle, a warning signal is sent to the computer instructing it to emit a synthesized voice message via the speaker to warn the driver not to change lanes. The warning message is only emitted however if the driver activates a turn signal corresponding to the direction of the

approaching vehicle while the approaching vehicle is within the predetermined range.

Although there has been shown and described the preferred embodiment of the present invention, it will be readily apparent to those skilled in the art that 5 modifications may be made thereto which do not exceed the scope of the appended claims. Therefore, the scope of the invention is only to be limited by the following claims.